CBSE NCERT Based Chapter wise Questions (2025-2026)

Class-XII

Subject: Physics

Chapter Name : *Dual nature of Radiation and Matter* (Chapter : 3)

Total : 07 Marks (expected) [MCQ(2)-1 Mark, SA(1)-2 Marks, LA(1)-3 Marks]

Level - 2(Higher Order)

MCQ Type Questions :

1. A radio transmitter operates at a frequency of 880 kHz and a power of 10 kW. The number of photons emitted per second is

Ⓐ 1.72×10^{31} Ⓑ 13.27×10^{24} Ⓒ 13.27×10^{34} Ⓓ 13.27×10^{44}

[Hints : the number of photons emitted per second $N = \frac{p}{h\gamma}$**]**

2. Photoelectric emission occurs only when the incident light has more than a certain minimum

Ⓐ frequency Ⓑ power Ⓒ wavelength Ⓓ intensity

3. A particle of mass M at rest decays into two masses m_1 and m_2 with non zero velocities. The ratio of de-Broglie wavelength of the particles $\frac{\lambda_1}{\lambda_2}$ is

Ⓐ $\frac{m_1}{m_2}$ Ⓑ $\frac{m_2}{m_1}$ Ⓒ 1 : 1 Ⓓ $\sqrt{\frac{m_1}{m_2}}$

4. The wavelength associated with 1 MeV proton is

Ⓐ 28.6 pm Ⓑ 2.86 pm Ⓒ 2.86 fm Ⓓ 28.6 fm

[Hints : Use the formula $\lambda = \frac{h}{\sqrt{2m_p E_h}}$**]**

5. Find the wavelength of 100 eV electron

Ⓐ 1.272 Å Ⓑ 1.72 Å Ⓒ 1.24 nm Ⓓ 11.2 V

[Hints : $\lambda = \frac{h}{\sqrt{2mK}}$ $\lambda = \frac{h}{\sqrt{2meV}}$**]**

Short Answer Type Questions (SAQ)

6. Work function of sodium is 2.3 eV. Does sodium show photoelectric emission for light of wavelength 6800 Å? Explain.

[Hints : find energy of a photon by the equation $E = \frac{hC}{\lambda}$**]**

7. Find the de-Broglie wavelength of electrons moving with a speed of 7×10^6 ms^{-1}.

[Hints : $\lambda = \frac{h}{p} = \frac{h}{mv}$**]**

8. Give an example each of metal from which photoelectric emission takes place when irradiated by (i) UV light (ii) visible light.

9. Radiations of two photons energy twice and ten times the work function of metal are incident on the metal surface successively. Find the ratio of maximum velocities of photoelectrons emitted in two cases.

[Hints : Use $h\gamma = W_0 + \frac{1}{2}mv^2$**]**

Long Answer Type Questions (LAQ)

10. A metal has a threshold wave length of 6000 Å. Calculate (i) threshold frequency (ii) work function.

11. The wavelength of a photon is 1.4 Å. If collides with an electron at rest. Its wavelength after collision is 2.0 Å. Calculate the energy of the scattered electron.

[**Hints : energy of scattered electron** = $E_2 - E_1 = hC\left(\frac{1}{\lambda_2} - \frac{1}{\lambda_1}\right)$

12. If a surface of work function 1.5 eV is illuminated by light of wavelength 198 nm, find the kinetic energy of emitted electron.

[**Hints : Use the equation** $h\gamma = W_0 + \frac{1}{2}mv^2$]

13. A monochromatic source of light operating at 200 W emits 4×10^{20} photons per second. Find the wavelength of the light?

ANSWER

1.	Ⓐ	**6.**		**10.**	(i) 5×10^{14} Hz (ii) 2.07 eV
2.	Ⓐ	**7.**		**11.**	
3.	Ⓒ	**8.**		**12.**	4.75 eV
4.	Ⓓ	**9.**		**13.**	400 nm
5.	Ⓐ				